PRINCIPLES OF DIGITAL SIGNAL PROCESSING

(Professional Elective-IV)

Course Code : 15IT1104

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Course Outcomes:

At the end of the Course, the Student will be able to:

CO 1 Discuss role of signals and systems in engineering.

CO 2 Design filtering methods based on DFT and FFT.

CO 3 Describe different design procedures of IIR filters.

CO 4 Design FIR filters using windowing techniques.

CO 5 Identify applications of digital signal processing..

UNIT-I (12 Lectures)

SIGNALS AND SYSTEMS:

Basic elements of DSP, concepts of frequency in Analog and Digital Signals, sampling theorem, Discrete time signals, systems –Analysis of discrete time LTI systems, Z transform, Convolution(linear and circular), Correlation.

UNIT-II (10 Lectures)

FREQUENCY TRANSFORMATIONS:

Introduction to DFT, Properties of DFT, Filtering methods based on DFTFFT Algorithms, Decimation in time Algorithms, Decimation, in frequency Algorithms, Use of FFT in Linear Filtering, DCT.

UNIT-III (10 Lectures)

IIR FILTER DESIGN:

Structures of IIR,Analog filter design, Discrete time IIR filter from analog filter, IIR filter design by Impulse Invariance, Bilinear

transformation, Approximation of derivatives(HPF, BPF, BRF), filter design using frequency translation

UNIT-IV (10 Lectures)

FIR FILTER DESIGN:

Structures of FIR, Linear phase FIR filter, Filter design using windowing techniques, Frequency sampling techniques,Finite word length effects in digital Filters

UNIT-V (8 Lectures)

APPLICATIONS:

Multi rate signal processing, Speech compression, Adaptive filter, Musical sound processing, Image enhancement.

TEXT BOOKS:

1. John G. Proakis & Dimitris G. Manolakis, “Digital Signal Processing – Principles, Algorithms & Applications”, 4th Edition, Pearson Education / Prentice Hall, 2007.
2. Emmanuel C.Ifeachor & Barrie.W.Jervis, “Digital Signal Processing”, 2nd Edition, Pearson Education / Prentice Hall, 2002.

REFERENCES:

1. Sanjit K. Mitra, “Digital Signal Processing – A Computer Based Approach”, Tata AMcGraw Hill, 4th Edition, 2007.
2. Alan V.Oppenheim, Ronald W. Jchafer&Hohn. R.Back, “Discrete Time Signal Processing”, 2nd Edition, Pearson Education, 2001.
3. Andreas Antoniou, “Digital Signal Processing”, 2nd Edition, Tata McGraw Hill, 2009.